Practice Tests Set 16 – Paper 1H mark scheme, performance data and suggested grade boundaries

Q	Working	Answer	Mark	Notes
1 (a)		2.84×10^9	1	B1
(b)		0.000 25	1	B1
				Total 2 marks

Q	Working	Answer	Mark	Notes
2 (a)		5y3(3y + 4u)	2	B2 for 5y3(3y + 4u)
				(B1 for 5y(3y3 + 4uy2) or 5y2(3y2 + 4uy) or y2(15y2 + 20uy) or y3(15y + 20u) or 5y3(…) where there is only one mistake in the brackets)
(b)	$4 \times (4 - 3x) = 5 - 8x$ oe $\quad$ or $16 - 12x = 5 - 8x$ oe $\quad$ or $4 - 3x = \dfrac{5}{4} - 2x$ oe		3	M1 for removal of fraction in a correct equation
	e.g. $16 - 5 = 12x - 8x$ or $11 = 4x$ oe $\quad$ or $4 - \dfrac{5}{4} = 3x - 2x$			M1 for terms in x on one side and numbers on the other side in an equation, allow correct rearrangement of their equation in the form ax + b = cx + d
		2.75		A1 (dep on M1) oe e.g. $2\dfrac{3}{4}$ or $\dfrac{11}{4}$
				Total 5 marks

1

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3	(a)		$16x^{12}y^{20}$	2	B2	B1 for an answer in the form $ax^n y^m$ with 2 correct from $a = 16$, $n = 12$, $m = 20$
	(b)(i)	$(x \pm 9)(x \pm 4)$		2	M1	for $(x \pm 9)(x \pm 4)$ **or** for $(x + a)(x + b)$ where $ab = -36$ or $a + b = 5$
			$(x + 9)(x - 4)$		A1	
	(ii)		$-9, 4$	1	B1	ft from (b)(i)
						Total 5 marks

4	(a)	0.6×0.9		2	M1	oe
			0.54		A1	oe e.g. $\dfrac{27}{50}, \dfrac{54}{100}$, 54%
	(b)	$0.6 \times 0.1 \ (= 0.06)$ **or** $0.4 \times 0.25 \ (= 0.1)$ **or** $0.4 \times 0.75 \ (= 0.3)$		3	M1	oe
		$0.6 \times 0.1 + 0.4 \times 0.25$ **or** $1 - (0.4 \times 0.75) - \text{"}0.54\text{"}$			M1	oe, ft their answer from (a)
			0.16		A1	oe e.g. $\dfrac{4}{25}, \dfrac{8}{50}, \dfrac{16}{100}$, 16%
						Total 5 marks

2

5	(a)	$8x^2 + 20x - 6x^2 + 9x$		2	M1	3 correct terms or all 4 terms condoning incorrect signs
			$2x^2 + 29x$		A1	
	(b)	eg $y^5 \times y^n = y^{19}$ or $y^{-1} \times y^n = y^{13}$ or $5 + n - 6 = 13$		2	M1	Use of 1 rule of indices or a correct linear equation in n
			14		A1	Accept y^{14}
	(c)(i)	$7t - 2t < 7 + 8$ oe eg $5t < 15$ oe		2	M1	Terms in t on one side and number terms the other side – may be in an equation or the incorrect inequality sign or an answer of $t = 3$ or eg $t \geq 3$
			$t < 3$		A1	
	(ii)		open circle at $t = 3$ and a line with an arrow to the left	1	B1ft	ft their inequality. Allow a line without an arrow if it reaches to at least −5, with an arrow it can be any length
						Total 7 marks

6		$2x(x-5)=2x^2-10x$ **or** $2x(x-3)=2x^2-6x$ **or** $(x-5)(x-3)=x^2-5x-3x+15(=x^2-8x+15)$		3	M1	for multiplying $2x$ by a bracket with both terms correct **or** the 2 brackets with at least 3 out of 4 terms correct or at least 2 out of 3 terms correct
		$(2x^2-10x)(x-3)=2x^3-6x^2-10x^2+30x$ **or** $(2x^2-6x)(x-5)=2x^3-10x^2-6x^2+30x$ **or** $2x(x^2-5x-3x+15)=2x^3-10x^2-6x^2+30x$ **or** $2x(x^2-8x+15)=2x^3-16x^2+30x$			M1	(dep) for multiplying the product of $2x$ and the 1st bracket (ft from the 1st stage) by the 2nd bracket and getting at least 3 out of 4 terms correct **or** multiplying the product of the 2 brackets (ft from the 1st stage) by the $2x$, and getting at least 3 out of 4 or 2 out of 3 terms correct
			$2x^3-16x^2+30x$		A1	
						Total 3 marks

7	(a)(i)		Correct line	1	B1	For $x=1.5$ drawn
	(ii)		Correct line	1	B1	For $y=x$ drawn
	(iii)		Correct line	1	B1	For $x+y=6$ drawn
	(b)		Correct region	1	B1	dep on B3 for correctly indicating the region **R** accept unlabelled or unshaded if clear. Shading can be 'in' or 'out'.
						Total 4 marks

8	(i)		21, 27	1	B1	
	(ii)		21, 23, 24, 25, 27, 29	1	B1	
						Total 2 marks

9			3, 7, 8, 8 and one of 4 or 5 or 6	3	B3	For a list of 5 correct numbers (B2 for a list of 5 numbers with 2 of: median of 7, mode of 8, range of 5 B1 for a list of 5 or 6 numbers with 1 of: median of 7, mode of 8, range of 5)
						Total 3 marks

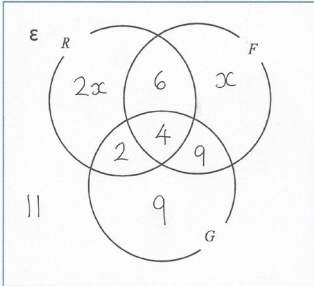| 10	(b)	$p^2 = \dfrac{ac+8}{3+c}$		4	M1	for removing square root
		$3p^2 + cp^2 = ac + 8$			M1	for multiplying by denominator and expanding in a correct equation
		$cp^2 - ac = 8 - 3p^2$ **or** $3p^2 - 8 = ac - cp^2$			M1ft	for gathering terms in c on one side and other terms the other side ft their equation dep on 2 terms in c and two other terms
			$c = \dfrac{8 - 3p^2}{p^2 - a}$		A1	or $c = \dfrac{3p^2 - 8}{a - p^2}$
						Total 4 marks

11	(a)	$\dfrac{8--4}{5-9}\left(=\dfrac{12}{-4}\right)$ oe or $\dfrac{-4-8}{9-5}\left(=\dfrac{-12}{4}\right)$ oe		2	M1	condone correct gradient embedded in an equation e.g. $y=-3x+c$ **or** expression e.g. $-3x$ **or** for an answer of 3
			-3		A1	
	(b)		$\dfrac{1}{4}$	1	B1	accept 0.25 or $-\dfrac{1}{-4}$ oe
						Total 3 marks

12			$2^4\times3^2\times5^4\times11\times13$	2	B2	(B1 for 12 870 000 or correct unsimplified product or $2^m\times3^n\times5^p\times11\times13$ with at least 1 of m, n or p correct or for $2^4\times3^2\times5^4$)
						Total 2 marks

6

13	$\dfrac{4(x+1)-3(x-2)}{(x-2)(x+1)}$ **or** $\dfrac{4(x+1)}{(x-2)(x+1)} - \dfrac{3(x-2)}{(x-2)(x+1)}$		3	M1	for expressing both fractions correctly with a common denominator.
	$\dfrac{4x+4-3x+6}{(x-2)(x+1)}$ **or** $\dfrac{4x+4-3x+6}{x^2-x-2}$			M1	for removing brackets in a single fraction with a correct denominator. Allow denominator to be expanded. Allow one error in the expansion of the numerator.
		$\dfrac{x+10}{(x-2)(x+1)}$		A1	accept $\dfrac{x+10}{x^2-x-2}$ oe
					Total 3 marks

14	(a)			3	B3	For all sections completed correctly (B2 for 5 or 6 sections correct (excl x), B1 for 3 or 4 sections correct (excl x))
	(b)	$2x + 6 + x + 2 + 4 + 9 + 9 + 11 = 80$ $(80 - 6 - 2 - 4 - 9 - 9 - 11) \div 3$		3	M1ft	ft their Venn diagram A correct equation to find x or subtracting all numerical values from 80 and dividing by 3 or other fully correct method to find x with all sections completed
		$x = 13$			A1	correct value for x
			38		B1	their $2x + 12$
						Total 6 marks

15		(definition of part: there are 3 parts: one part is the number, one part the letter t and one part the letter w Definition of terms: there are 6 terms: 2 number terms, 2 terms in t and 2 terms in w)		3	M1 indep	Fully correct cancellation of any two parts of their fraction at any stage of working
					M1 indep	correctly apply the negative power to the whole of their bracket (all parts or all terms) **or** correctly square all parts or terms of their bracket **or** correctly apply the negative power AND square of at least two parts (maybe 4 terms) of their bracket
			$4t^4w^2$		A1	Allow $(2t^2w)^2$ after the correct answer
		ALTERNATIVE				
				3	M2	2 correct terms (M1 for 1 correct term)
			$4t^4w^2$		A1	Allow $(2t^2w)^2$ after the correct answer
						Total 3 marks

16		$13 - 4$		2	M1	For selecting 4 and 13
			9		A1	
						Total 2 marks

17	E.g. $\dfrac{2}{6-3\sqrt{2}}\times\dfrac{6+3\sqrt{2}}{6+3\sqrt{2}}$ or $\dfrac{2}{6-3\sqrt{2}}\times\dfrac{-6-3\sqrt{2}}{-6-3\sqrt{2}}$		3	M1	for rationalising the denominator by multiplying numerator and denominator by $6+3\sqrt{2}$ (or $-6-3\sqrt{2}$)
	$\dfrac{12+6\sqrt{2}}{36-18\sqrt{2}+18\sqrt{2}-18}$ or $\dfrac{12+6\sqrt{2}}{18}$ or $\dfrac{12+6\sqrt{2}}{6^{2}-\left(3\sqrt{2}\right)^{2}}$ or $\dfrac{12+6\sqrt{2}}{6^{2}-9\times2}$			M1	(numerator may be expanded or denominator may be 4 terms which need to be all correct)
		$\dfrac{2+\sqrt{2}}{3}$		A1	or for stating a = 2 and b = 3 for $\dfrac{2+\sqrt{2}}{3}$ from correct working dep on M2
					Total 5 marks

18	e.g. $40+8\sqrt{x}-5\sqrt{x}-\sqrt{x}\sqrt{x}$ or $40+8\sqrt{x}-5\sqrt{x}-\left(\sqrt{x}\right)^{2}$ or $40+8\sqrt{x}-5\sqrt{x}-x$ or $40+3\sqrt{x}-x$		3	M1	for a correct expansion with at least 3 out of 4 terms correct oe or all 3 terms correct
		$x = 19$		A1	(dep on M1) for x = 19
		$y = 3$		B1	for y = 3
					Total 3 marks

19	(a)		1	1	B1	
	(b)	$3 \times 10^{125} + 2 \times 10^{124}$ **or** digits 1024×10^n oe		3	M1	
		32×10^{124} **or** $3 \times 10^{125} + 0.2 \times 10^{125}$ **or** $30 \times 10^{124} + 2 \times 10^{124}$			M1	oe 'correct' answer in incorrect form.
			3.2×10^{125}		A1	
						Total 4 marks

20	$(1-2y)^2 - 9y - (1-2y) = 2y^2 - 12$	$x^2 - 9\left(\dfrac{1-x}{2}\right) - x = 2\left(\dfrac{1-x}{2}\right)^2 - 12$		5	M1 substitution of linear equation into quadratic
	e.g. $2y^2 - 11y + 12 (= 0)$ oe allow $2y^2 - 11y = -12$ oe	e.g. $x^2 + 9x + 14 (= 0)$ oe allow $x^2 + 9x = -14$ oe			A1 (dep on M1) writing the correct quadratic expression in the form $ax^2 + bx + c (= 0)$ allow $ax^2 + bx = c$
	e.g. $(2y-3)(y-4)(=0)$ $(y=) \dfrac{11 \pm \sqrt{(-11)^2 - 4 \times 2 \times 12}}{2 \times 2}$ e.g. $2\left[\left(y - \dfrac{11}{4}\right)^2 - \left(\dfrac{11}{4}\right)^2\right] = -12$ oe	e.g. $(x+7)(x+2)(=0)$ $(x=) \dfrac{-9 \pm \sqrt{9^2 - 4 \times 1 \times 14}}{2}$ e.g. $\left(x + \dfrac{9}{2}\right)^2 - \left(\dfrac{9}{2}\right)^2 = -14$			M1 (dep on M1) for a complete method to solve their 3-term quadratic equation (allow one sign error and some simplification – allow as far as $\dfrac{11 \pm \sqrt{121 - 72}}{4}$ or $\dfrac{-9 \pm \sqrt{81 - 56}}{2}$)
	$y = \dfrac{3}{2}$ oe and $y = 4$	$x = -7$ and $x = -2$			A1 (dep on M1) both x-values **or** both y-values
			$x = -2$, $y = \dfrac{3}{2}$ oe and $x = -7$, $y = 4$		A1 (dep on first M1) must be paired correctly
					Total 5 marks

21	$\overrightarrow{AB}=2\mathbf{b}-2\mathbf{a}$ oe or $\overrightarrow{BA}=2\mathbf{a}-2\mathbf{b}$ oe or $\overrightarrow{AM}=\mathbf{b}-\mathbf{a}$ oe or $\overrightarrow{MA}=\mathbf{a}-\mathbf{b}$ oe or $\overrightarrow{BM}=\mathbf{b}-\mathbf{a}$ oe or $\overrightarrow{MB}=\mathbf{a}-\mathbf{b}$ oe		6	M1	for finding $\overrightarrow{AB}$ or $\overrightarrow{BA}$ or $\overrightarrow{AM}$ or $\overrightarrow{MA}$ or $\overrightarrow{BM}$ or $\overrightarrow{MB}$
	e.g. $\overrightarrow{OM}=2\mathbf{a}+(\mathbf{b}-\mathbf{a})\,(=\mathbf{a}+\mathbf{b})$ oe or $\overrightarrow{MO}=(\mathbf{b}-\mathbf{a})-2\mathbf{b}\,(=-\mathbf{a}-\mathbf{b})$ oe or $\overrightarrow{AN}=\dfrac{4}{3}\mathbf{b}-2\mathbf{a}$ oe or $\overrightarrow{NA}=2\mathbf{a}-\dfrac{4}{3}\mathbf{b}$ oe			M1	for finding $\overrightarrow{OM}$ or $\overrightarrow{MO}$ or $\overrightarrow{AN}$ or $\overrightarrow{NA}$
	e.g. $\overrightarrow{OP}=2\mathbf{a}+\lambda\left(\dfrac{4}{3}\mathbf{b}-2\mathbf{a}\right)$ oe or $\overrightarrow{OP}=\dfrac{4}{3}\mathbf{b}+\lambda\left(2\mathbf{a}-\dfrac{4}{3}\mathbf{b}\right)$ oe or $\overrightarrow{OP}=\mu(\mathbf{a}+\mathbf{b})$ oe **OR** $\overrightarrow{MP}=\mathbf{a}-\mathbf{b}+k\left(\dfrac{4}{3}\mathbf{b}-2\mathbf{a}\right)$ oe or $\overrightarrow{MP}=\mathbf{b}-\mathbf{a}-\dfrac{2}{3}\mathbf{b}+k\left(2\mathbf{a}-\dfrac{4}{3}\mathbf{b}\right)$ oe or $\overrightarrow{MP}=t(-\mathbf{a}-\mathbf{b})$ oe			M1	for finding $\overrightarrow{OP}$ or $\overrightarrow{PO}$ or $\overrightarrow{MP}$ or $\overrightarrow{PM}$
	e.g. $2\mathbf{a}+\lambda\left(\dfrac{4}{3}\mathbf{b}-2\mathbf{a}\right)=\mu(\mathbf{a}+\mathbf{b})$ oe or $\dfrac{4}{3}\mathbf{b}+\lambda\left(2\mathbf{a}-\dfrac{4}{3}\mathbf{b}\right)=\mu(\mathbf{a}+\mathbf{b})$ oe or $\mathbf{a}-\mathbf{b}+k\left(\dfrac{4}{3}\mathbf{b}-2\mathbf{a}\right)=t(-\mathbf{a}-\mathbf{b})$ oe or $\mathbf{b}-\mathbf{a}-\dfrac{2}{3}\mathbf{b}+k\left(2\mathbf{a}-\dfrac{4}{3}\mathbf{b}\right)=t(-\mathbf{a}-\mathbf{b})$ oe			M1	for setting up an equation for $\overrightarrow{OP}$ or $\overrightarrow{MP}$
	$\mu=\dfrac{4}{5}$ or $t=\dfrac{1}{5}$			M1	for finding μ or t for either $\overrightarrow{OP}=\mu\overrightarrow{OM}$ or $\overrightarrow{MP}=t\overrightarrow{MO}$
		4 : 1		A1	cao (dep on M3)
					Total 6 marks

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Qn	Paper	Question	Mean score	Max score	Mean %	ALL	Edexcel averages: scores of candidates who achieved grade:							
							9	8	7	6	5	4	3	U
1	1H	Q06	1.70	2	85	1.70	1.99	1.92	1.88	1.76	1.62	1.22	0.80	0.29
2	1H	Q05	3.82	5	76	3.82	4.89	4.80	4.39	3.82	3.07	1.82	1.12	0.10
3	1H	Q09	3.74	5	75	3.74	4.92	4.70	4.36	3.59	2.98	1.66	1.00	0.34
4	1H	Q14	3.47	5	69	3.47	4.91	4.63	4.35	3.32	1.96	0.86	0.58	0.07
5	2H	Q05	5.18	7	74	5.18	6.61	6.15	5.70	4.99	4.47	3.07	1.86	0.51
6	1H	Q12b	2.00	3	67	2.00	2.82	2.61	2.39	2.00	1.20	0.60	0.33	0.01
7	2H	Q04	2.63	4	66	2.63	3.91	3.56	3.02	2.16	1.52	0.88	0.45	0.22
8	1H	Q04	1.37	2	69	1.37	1.86	1.74	1.47	1.23	1.02	0.69	0.42	0.11
9	2H	Q02	1.98	3	66	1.98	2.72	2.45	2.18	1.67	1.61	1.12	0.46	0.16
10	2H	Q14b	2.24	4	56	2.24	3.79	3.15	2.43	1.58	0.90	0.41	0.14	0.06
11	1H	Q13	1.66	3	55	1.66	2.74	2.29	1.78	1.23	0.87	0.25	0.26	0.04
12	2H	Q09	1.02	2	51	1.02	1.74	1.37	1.14	0.63	0.49	0.27	0.18	0.01
13	1H	Q12a	1.57	3	52	1.57	2.72	2.17	1.66	1.14	0.69	0.21	0.03	0.00
14	2H	Q16	3.05	6	51	3.05	5.00	4.33	3.07	2.30	1.47	0.80	0.31	0.09
15	2H	Q11	1.58	3	53	1.58	2.59	2.03	1.51	1.25	0.93	0.56	0.33	0.06
16	2H	Q12	1.00	2	50	1.00	1.59	1.24	1.00	0.86	0.64	0.32	0.17	0.01
17	1HR	Q15b	1.74	3	58	1.74	2.73	1.99	1.20	0.65	0.14	0.11	0.00	0.00
18	1H	Q18	1.19	3	40	1.19	2.37	1.55	1.13	0.73	0.39	0.15	0.04	0.01
19	2H	Q06	1.58	4	40	1.58	2.77	1.83	1.46	1.14	0.89	0.67	0.46	0.24
20	1H	Q19	1.29	5	26	1.29	3.48	1.49	0.69	0.32	0.11	0.03	0.00	0.00
21	1H	Q23	0.91	6	15	0.91	2.32	1.26	0.51	0.18	0.05	0.01	0.03	0.00
			44.72	**80**		**44.72**	**68.47**	**57.26**	**47.32**	**36.55**	**27.02**	**15.71**	**8.97**	**2.33**

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	73	63	52	42	32	21	12